ESSAY

DOES YOUR LAB USE SOCIAL MEDIA?

SHARING THREE YEARS OF EXPERIENCE IN SCIENCE COMMUNICATION

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Emerging social media platforms provide great opportunities for research groups to effectively communicate Earth and climate sciences to the general public.

"Science is not finished until it is communicated."
—Sir Mark Walport, former Government Chief Scientific Adviser in the United Kingdom

Humankind faces several major challenges, of which climate change and its consequences are among the most perilous [United Nations Framework Convention on Climate Change (UNFCCC) 2015]. Options for tackling global environmental issues require both high-level political decisions and public behavioral change. In both cases, the role of sound science and scientific literacy is crucial. Significant advances in our understanding of climate change have been achieved, leading to a consensus within the science community that it is primarily the result of human activity (Pachauri et al. 2014). However, the communication of climate science beyond the scientific community is still particularly challenging, and this strong scientific consensus is often unrecognized by the general public (Somerville and Hassol 2011). In these circumstances, researchers can play a more active role in climate science communication (Moser 2010). Additionally, science is funded by the public, and communicating scientific findings to the public is part of the mandate of researchers.

Polar regions are changing faster than other parts of the planet. Understanding the ongoing rapid changes in the Arctic is key to improving future projections of Earth's climate (Pachauri et al. 2014). Communicating polar science is particularly important to bring these regions to the attention of the public, funding agencies, policymakers, and the

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global scientific community. In addition to conventional media channels, the last decade has witnessed the rise of social media with millions of users. These social media platforms provide abundant potential for reaching out to the general public and can be used not only by professional science communicators but also by ordinary researchers (Bik and Goldstein 2013).

In this study, we address the issue of increasing demand for science communication efforts in the research community. We do so by sharing our experience of exploring various social media platforms for communicating Arctic and Antarctic science. Furthermore, we provide practical tips on the successful use of social media platforms for science communication purposes. By doing so, we hope to inspire other research groups, individual researchers, and institutions to further engage in science communication efforts.

@OCEANSEAICENPI: A MODERN APPROACH TO SCIENCE COMMUNICATION.

Motivation and concept of @oceanseaicenpi initiative. We are a relatively small interdisciplinary research group of Earth scientists (<20 researchers, postdoctoral researchers, and graduate students at a given time), part of the Ocean and Sea Ice section at the Norwegian Polar Institute (NPI) in Tromsø, Norway. While living and working north of the Arctic Circle, we are witnessing some of the largest environmental transformations on the planet caused by ongoing anthropogenic climate change as a result of the phenomenon often referred to as Arctic amplification (e.g., Serreze and Barry 2011). The reality of climate change is the backdrop for the majority of our work, whether it is oceanographic, sea ice, atmospheric, or marine ecosystem studies. At both group and individual levels, we have a deep appreciation and concern for the future of our planet. As scientists, we understand our responsibility to actively communicate our research and knowledge. We believe that contributing to the scientific knowledge among the general public is an essential step in tackling the problems around climate change and in transitioning toward a more sustainable future.

During our first discussions about the @oceanseaicenpi social media initiative in February 2014 (Fig. 1), the primary motivations included the intention to communicate our research to a wide and diverse audience, including the general public, research community, funding agencies, journalists, policymakers, and others. When it comes to the general public, we specifically wanted to reach out to younger generations, as this is a target group where one can make the biggest impact in terms of education, influencing attitudes, and perception of environmental issues. The following key questions came up: How do we reach as many people as possible within various target groups? How do we achieve good science communication with limited time and financial resources? How can social media accounts be set up to have continuity despite the coming and going of participating scientists and short-term timelines of individual projects?

To reach as large an audience as possible, we chose to use several social media platforms. For the following three social media platforms, Facebook, Instagram, and Twitter, the audience exceeds 2.75 billion active users as of January 2017, according to Statista (www.statista.com/), an online statistics portal. In spring 2014, the science communication landscape in social media (e.g., on Twitter) typically included individual researchers and accounts of larger institutions, presumably managed by dedicated communications departments. At the time, Instagram had a great growth potential and was not widely used for science communication purposes. Both Twitter and Instagram platforms were initially chosen for the @oceanseaicenpi initiative, while a Facebook account was created a few months later (see the section titled "Our tools").

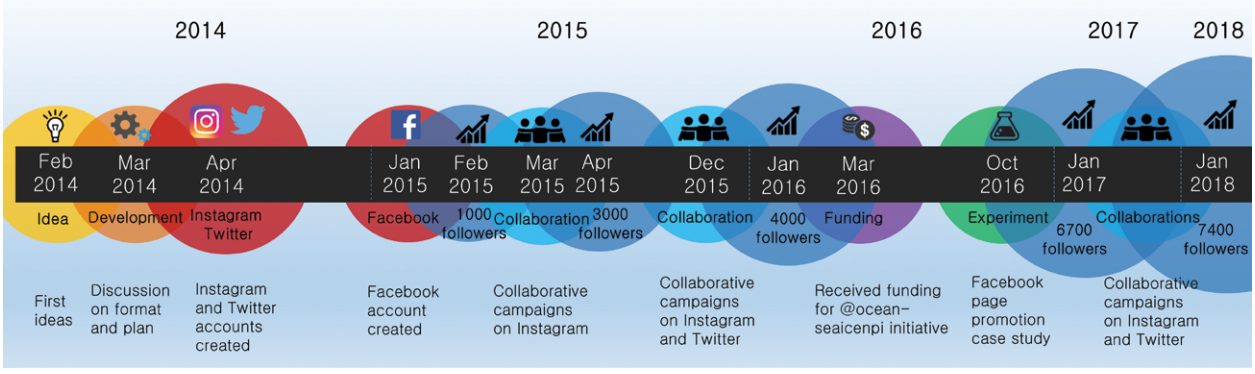

Fig. 1. Timeline of the @oceanseaicenpi initiative.

For this social media initiative to be successful, it was necessary that many people within the small team be involved. This meant that the workload could be shared among many and that the activity level of @oceanseaicenpi was less dependent on the presence or absence of individual team members. Such a model requires internal guidelines describing the procedure of putting a post together. These guidelines were developed by the @oceanseaicenpi team in consultation with the communications department of the institute. The social media accounts were created for the "Ocean and Sea Ice" research group rather than for a particular project of the group, giving these accounts potentially an unlimited lifetime.

Our tools. Instagram was chosen as the primary tool as it provides the ability to post visually appealing pictures and videos with captions up to 2,200 characters long, making it a great tool for sharing numerous photos and videos collected by the team and other NPI researchers during polar expeditions. According to Statista, Instagram is one of the fastest growing social media platforms, with the number of monthly active users rising from 200 to 600 million between March 2014 and December 2016. Furthermore, for the first half of 2014, youth constituted the key target audience of this platform, with 41% and 35% for age groups of 16–24 and 25–34 years, respectively.

As a unique microblogging platform often used by journalists and professional communicators, Twitter was chosen as the second social media platform. A number of articles describe the benefits of Twitter in the academic environment and why Twitter has become so popular among researchers (Van Noorden 2014). Based on Statista, the Twitter audience has grown from 255 to 317 million active monthly users between the first quarter of 2014 and the fourth quarter of 2016. The Twitter audience is older than those on Instagram. In the United States, for instance, 36% of Twitter users are in the age group of 18–29 years, and 23% and 21% are in the age groups of 30–49 and 50–64 years, respectively (Greenwood et al. 2016).

In January 2015, the @oceanseaicenpi Facebook account was created. Facebook is the largest social media network, with 1.276 billion monthly active users in the first quarter of 2014 growing to 1.86 billion in the last quarter of 2016, according to Statista. As of January 2017, the majority (59%) of monthly active Facebook users were between the ages of 18 and 34 years. Our Facebook account was originally designed to share posts from the Instagram account.

Altogether, the presence on these three social media platforms provides a potential reach of more than

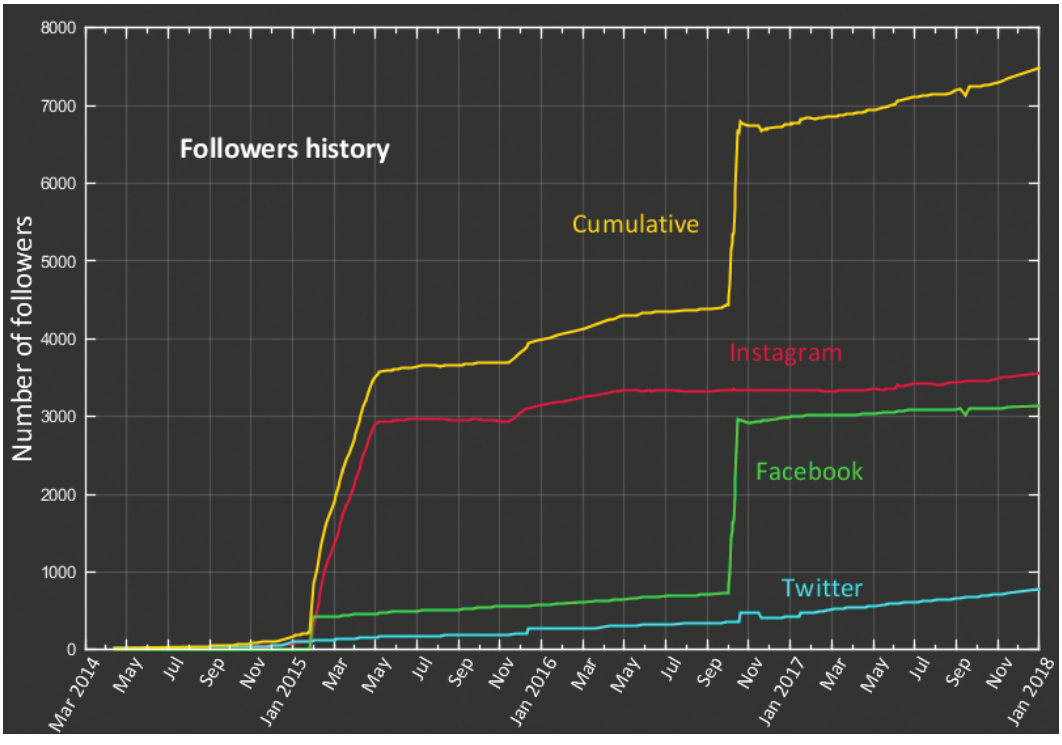

Fig. 2. Number of cumulative followers (yellow) and for each @oceanseaicenpi account: Instagram (red), Twitter (blue), and Facebook (green) for the social media initiative lifespan.

2.75 billion users as of late 2016. Equally important, these social media platforms are free to use, which is ideal in the context of limited funding resources. Last, but not least, the choice of Instagram, Twitter, and Facebook was also driven by our personal experiences and familiarity with these media platforms.

Our audience. Using these social media platforms, we initially expected to connect with a mostly younger audience from across the planet. Colleagues, family, and friends drove the follower growth during the first 9 months, a period during which the number of followers remained relatively low (Fig. 2). Between January and June 2015, our group's involvement in the large international Norwegian Young Sea Ice Cruise (N-ICE2015) expedition in the Arctic Ocean (Granskog et al. 2016) triggered a large audience growth, increasing the number of followers on Instagram from 80 to 3,000 followers.

This audience growth was due to three reasons: the expedition was unique and photogenic; the posts during the expedition were followed by many of our international collaborators and their families and friends; and most importantly, our account was referenced by other social media accounts. For example, in February 2015, photos of the expedition were posted on the National Geographic Instagram account (@natgeo) and on the Instagram account of photojournalist Nick Cobbing (@nickcobbing) with a reference to our Instagram account. This led to an increase of 500+ followers on Instagram in the second half of February 2015. More collaborative posts in March and April 2015 further increased the number of followers.

Another significant audience growth took place in October 2016 on our Facebook account (Fig. 2), which was linked to a page promotion campaign, discussed in the section titled "Paid advertisements and promotions." During that campaign, the number of Facebook page likes increased from ~720 to ~2,900 and our overall number of followers across all platforms from ~4,500 to ~6,500 followers over the course of 14 days. Throughout the 3 years, the Twitter audience grew steadily, at a pace of 3–5 followers a week, and collaborative campaigns on that platform had little or no impact on the number of Twitter followers.

The regional spread and demographics of @oceanseaicenpi followers is different for each social media account [Fig. 3; Table ES1; more information can be found in the online supplement (https://doi.org/10.1175/BAMS-D-17-0195.2)]. On Instagram, a large fraction of our followers comes from the United States (35%), with the other leading countries being Norway, the United Kingdom, Canada, and Australia. Altogether, our Instagram followers are present in over 100 countries. On Facebook, the regional spread is also large, reaching 45 countries, with a majority of followers being from India (68%; see the section titled "Paid advertisements and promotions" for an explanation), followed by Norway and Brazil. For the Twitter

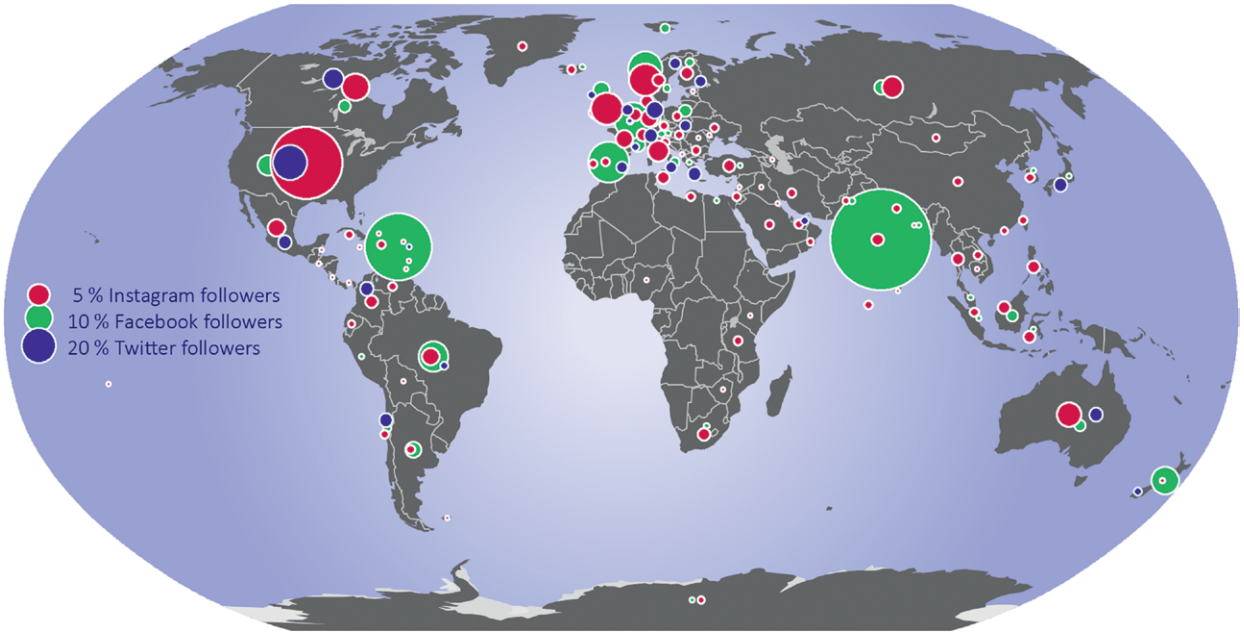

Fig. 3. Geographic spread of followers for the @oceanseaicenpi Instagram account (red), Facebook account (green), and Twitter account (blue), where the size of the dots on each country is proportional to the percentage of followers in that country (see Table ES1 in the supplemental information).

account, followers from the United States, Norway, and the United Kingdom constitute 60%. Followers across all accounts are young, with a majority being less than 25 years old on Instagram, 70% are less than 25 years old on Facebook, and 50% are between 25 and 35 years old on Twitter. Less than 2% of our overall followers are 75+ years old.

Active followers on Facebook are family members, friends, and colleagues who connected through the friends and "friends of friends" pools of @oceanseaicenpi team members. Twitter followers are mostly polar scientists, teachers, journalists, politicians, polar institutions, and consultants. Followers on Instagram are mostly North American youth interested in the outdoors, photography, and our planet. A large part of this audience was recruited through collaborative campaigns with bigger Instagram accounts belonging to photographers (e.g., @nickcobbing), artists, journalists (e.g., @andyisaacson), and *National Geographic* magazine (@natgeo).

Our posts. Posts across @oceanseaicenpi accounts are organized on a weekly schedule. Each post follows the subsequent procedure: a theme or photo is chosen by the team; text is drafted, edited, and agreed upon; and finally, the post is published on Instagram and further shared on Twitter and Facebook. On average, it takes in total 1.5 h spent by a number of team members to

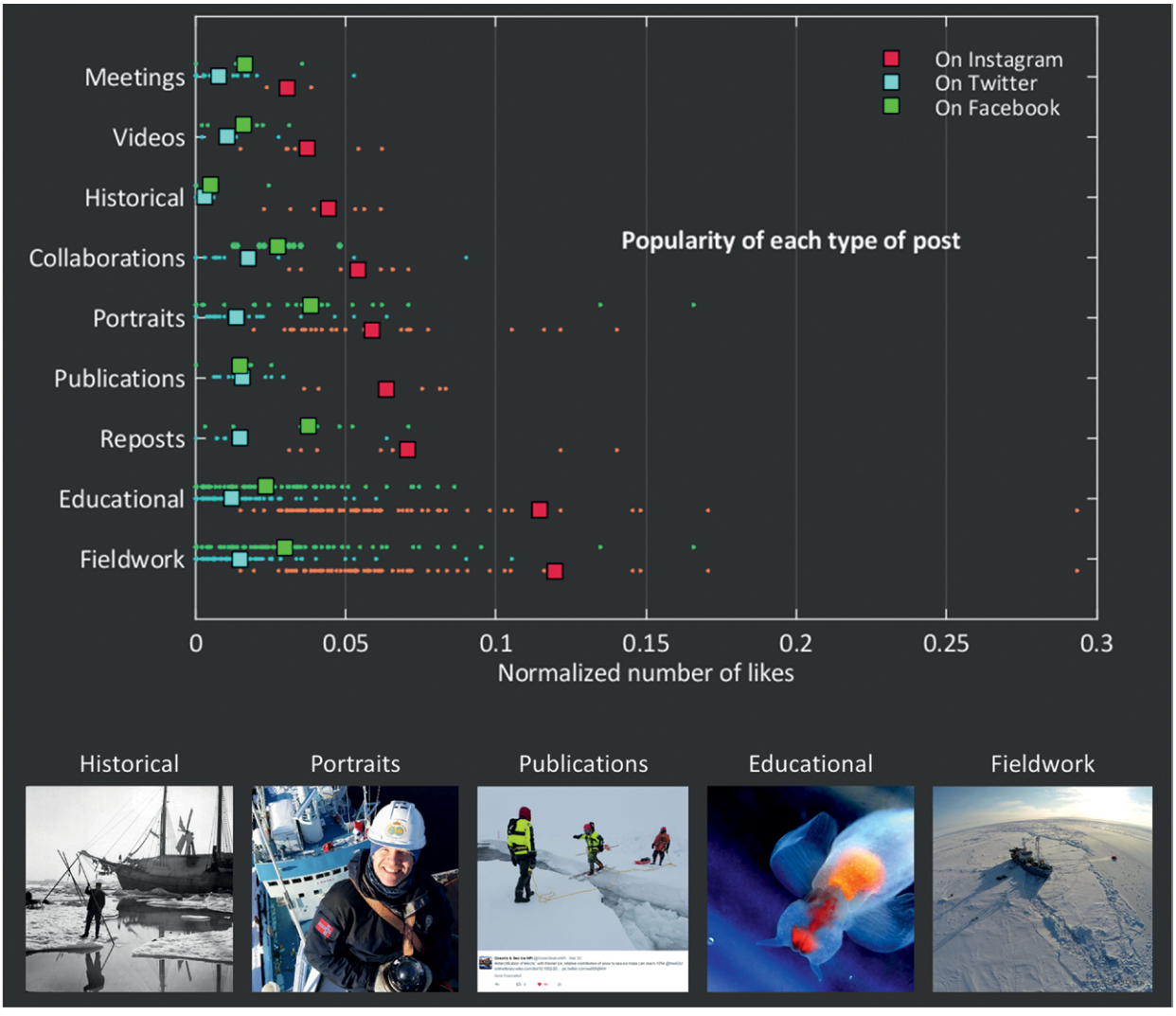

Fig. 4. (top) Popularity of each type of post based on likes on Instagram (red), retweets on Twitter (blue), and likes on Facebook (green), where the number of likes or retweets has been normalized by the number of followers at the time of the post. Small dots represent individual posts, while large squares are the mean for each type of post. Note that the *x* axis has been truncated for clarity and that some posts reached values close to 1. (bottom) Examples of photos from different types of posts used by @oceanseaicenpi: historical, portraits, publications, educational, and fieldwork. Photo credits are provided in the acknowledgments.

prepare a weekly post (see details in the section titled "Ways to maximize the effectiveness of your team").

Most posts fall into one or more of the following categories (Fig. 4, bottom):

- fieldwork posts related to expeditions, field activities, and techniques;
- educational posts explaining scientific concepts and findings and describing the polar environment, flora, and fauna;
- publication posts announcing recent publications by the team or by collaborators;
- portrait posts highlighting individual team members;
- historical posts highlighting photos from the NPI archives;
- meeting posts informing about updates from meetings or conferences;
- reposts showcasing posts from other social media accounts;
- collaboration posts connecting to social media accounts of collaborators, highlighting joint work and collaborative projects; and
- videos from fieldwork activities.

After a few months, the @oceanseaicenpi team quickly noticed that some types of posts performed better on certain platforms than on others (Fig. 4, top). Based on our own experience, fieldwork and educational posts are often very popular on Instagram, while posts about publications and meetings are not. Portrait posts do really well on Facebook, while meetings and publications posts are more welcomed on Twitter. Such differences can be explained by the type of followers for each social media platform. For example, friends and colleagues on Facebook relate well to posts about their colleagues and family members. Instagram followers, who are science-oriented young people, are keen to learn about science and fieldwork but not enthusiastic about conference news and technical scientific publications. Scientists and journalists on Twitter are curious about the latest research findings described during meetings, and publication posts and live tweeting from conferences has become the norm. Systematic methods to analyze social media usage by scientists are appearing (e.g., Ke et al. 2017) and could be used in further work to identify trends and behaviors across our social media platforms.

As it became clear what type of post did well on which social media platform, the @oceanseaicenpi team started tailoring posts accordingly. From June 2016 onward, updates about meetings and publications are no longer posted on Instagram but have been expanded on Twitter. More time is spent identifying and referencing other social media accounts and reposting content of interest to the community, primarily on Twitter and occasionally on Instagram and Facebook. This has quickly led to each account having a unique character.

A successful approach. Over a period of 3 years, the @oceanseaicenpi social media accounts have gathered over 7,000 followers from more than 100 countries. The initiative has been particularly successful on Instagram, where to our knowledge, @oceanseaicenpi is the most successful account in Earth sciences managed entirely by a research team (Fig. 5). Here, success is defined by the number of followers.

A selection of Instagram accounts belonging to institutions, research groups, and universities in the Earth sciences were identified for comparison with the @oceanseaicenpi Instagram account. Priority was given to accounts related to ocean and sea ice disciplines, closest to our own research, and run by scientists (see Table ES2 in the supplemental information). Altogether, 46 Instagram accounts were selected, of which 26 are managed by scientists and 20 are managed by professional departments (see Table ES2 in the supplemental information). Instagram accounts managed by professional departments mainly belong to larger institutions and clearly do better than accounts managed by scientists, with an average of 42,000 followers compared to 340 followers (Fig. 5). The @oceansceicenpi account is an exception, however, with 10 times more followers than the average account managed by scientists.

Given the size of NPI, the host institute where a total of 160 people are employed, and considering that on average, it only has one post per week, @oceanseaicenpi has collected a large number of followers and exceeded expectations. This achievement is all the more remarkable considering that none of the @oceanseaicenpi team members have formal training in science communication, outreach, or international relations.

This success can be explained by several factors. Having access to a nearly unlimited pool of inspiring polar fieldwork photos is a great advantage. Success on social media platforms is built on the perception of cool and awe-inspiring content. Themes such as polar bears, sea ice, exploration, and Arctic are rewarded with attention. Not to be underestimated is the freedom that the initiative @oceanseaicenpi has when it comes to the content and message of posts. Social media accounts of governmental agencies and

research institutes often have strict and risk-adverse guidelines that might slow the creative process.

Acquired skills and benefits. The academic performance of researchers is commonly assessed by the number and quality of scientific peer-reviewed publications. The "*h* index" metric, also called Hirsch number, has emerged in the last decade, where the more citations your research articles have, the higher your *h* index is (Hirsch 2005). A higher *h* index may open up more funding opportunities and wider recognition in the academic environment. Currently a number of alternative indicators are being proposed with the common name of "altmetrics," or alternative metrics (Piwowar 2013; Piwowar and Priem 2013; Kamat and Schatz 2014), which are meant to complement traditional citation-based metrics like *h* index. Many academic journals include altmetrics options to track what impact a particular study has on social media and in news outlets. This metric is provided by the Altmetric service (www.altmetric.com) and is calculated based on mentions on Twitter, shares on Facebook, reads on an academic social network Mendeley (www.mendeley.com), and whether the study has been picked up by news channels and blogs. By highlighting publications from our group using @oceanseaicenpi, we can increase the Altmetric score of these publications, and while this is done using the group's accounts, the metrics can be attributed to the individual authors.

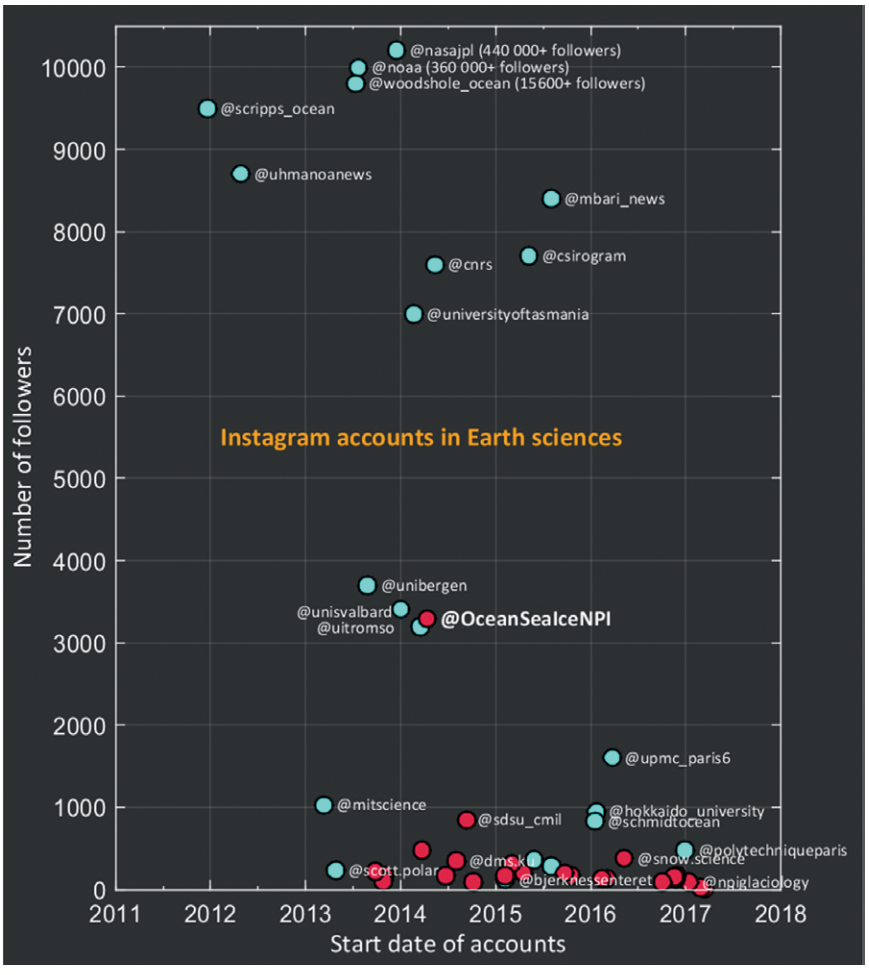

Fig. 5. Popularity of Instagram accounts (reflected by the number of followers) in Earth sciences as of Mar 2017, where accounts managed by scientists are shown in red and accounts managed by a communication department are in blue (see Table ES2 in the supplemental information).

We consider as an example 15 research articles, coauthored by members of our group and published in the *Journal of Geophysical Research* as a part of the N-ICE2015 special issue (https://agupubs.onlinelibrary.wiley.com/doi/toc/10.1002/(ISSN)2169-9291.NICE1) between July 2016 and April 2017. Among 15 publications, 3 were specifically highlighted via the Twitter and Facebook accounts of @oceanseaicenpi. The average Altmetric score for these three publications was 24.3 compared to 2.1 for publications not highlighted on social media. Featured publications were all within the top 25% of all research outputs scored by Altmetric. Highlights of recent research findings via @oceanseaicenpi social media accounts clearly boost the Altmetric scores of our research group publications and therefore the visibility of our research both within the scientific community and beyond. This has led to positive spin-off effects, where researchers from our group have been contacted by journalist and the media.

As highlighted by Joshua Schimel, the author of *Writing Science* (Schimel 2012, p. 3), "As a scientist, you are a professional writer" since your career is built on successful proposals and papers. This is certainly true, especially in today's competitive academic environment (Carson et al. 2013). To stand out under these

Table 1. Steps to develop and maintain a social media initiative in a research group.		
1)	Determine motivation	Increase science literacy and awareness and educate the public; disseminate science information; promote research findings from the team
2)	Get permission from your workplace	Submit activity proposal to leadership and/or communications department; adjust as necessary; agree on joint guidelines
3)	Identify audience	General public, youth, scientific community, journalists, policymakers, and others
4)	Identify the most useful platforms	Instagram, Twitter, Facebook, and others
5)	Set up accounts	Choose a unique account name for all platforms; set up accounts
6)	Create content	Agree on internal protocols; search for good examples; distribute tasks
7)	Regular post	Choose a time and day that reaches most of your audience and suits your team, which also give your team few working hours to respond to potential comments
8)	Additional posts	Occasional reposts on Facebook and Instagram and retweets on Twitter; more frequent posts on Twitter
9)	Evaluate performance	Analyze key metrics built in or provided by third parties; identify what works and what does not work well
10)	Determine growth strategies	Discuss paid advertisement campaigns and collaborations with other social media accounts
11)	Communicate and disseminate	Presentations at conferences; popular science publications; networking

circumstances, one has to not only lead high-quality research but also be able to write concisely, clearly, and in a way that engages the reader. Over the past 3 years, the @oceanseaicenpi team has practiced writing short, concise, and interest-catching texts on its science and findings to a wide audience on a weekly basis. These efforts have made us better writers, storytellers, and communicators, helping to develop skills that are often required for scientists (e.g., Bennett 2002).

PRACTICAL RECIPE FOR RESEARCH GROUPS.

Get support from your communications department. Establishing a good dialogue with your communication department and the leadership of the institution and getting their feedback is essential. Based on our experience, clearly describing your strategy and communication guidelines is an important first step in establishing social media accounts (Table 1). This might include a general description of motivation and goals, foreseen benefits for the group and the institution, and practical guidelines on what kind of posts you would like to do, including examples from existing social media communication channels.

Choose social media platforms that best suit your purpose. Remember that social media platforms are tools that help you convey your message to different target audiences in different regions. Considering the constant change in the social media landscape, we recommend doing a bit of research on the latest trends in social media. Portals such as Statista supply basic analytics for the number of users and general demographics of different social media platforms. General demographics and age trends across Instagram, Facebook, and Twitter are described in the section titled "Our tools."

Tailor your posts. Your audience will be key in what type of posts you prepare. As we detailed in the section titled "Our posts," what works well on Facebook might not work on Instagram. Based on our experience, specific tips for different social media platforms are as follows:

- Instagram posts rely on visually striking photos or videos. The accompanying text needs to be relevant, concise, written in layman's terms, and, most importantly, it needs to have a narrative structure. This is where storytelling comes in: the post should be written with one message in mind, around which the text is built. Start with the main message and give details later. The first sentence is critical for engaging the reader, as shown in a post about thin sections of sea ice, where a relatively abstract concept was made more engaging by linking it to art (Fig. 6). Building a story will help you connect with your audience emotionally. To grow your audience, tag collaborative partners when relevant and use appropriate hashtags.
- The Facebook audience, which is dominated by colleagues, friends, and family in the case of the @oceanseaicenpi initiative, seems to like posts about achievements of both the team and its members, projects, and results. Posts can be more technical and have more scientific content.

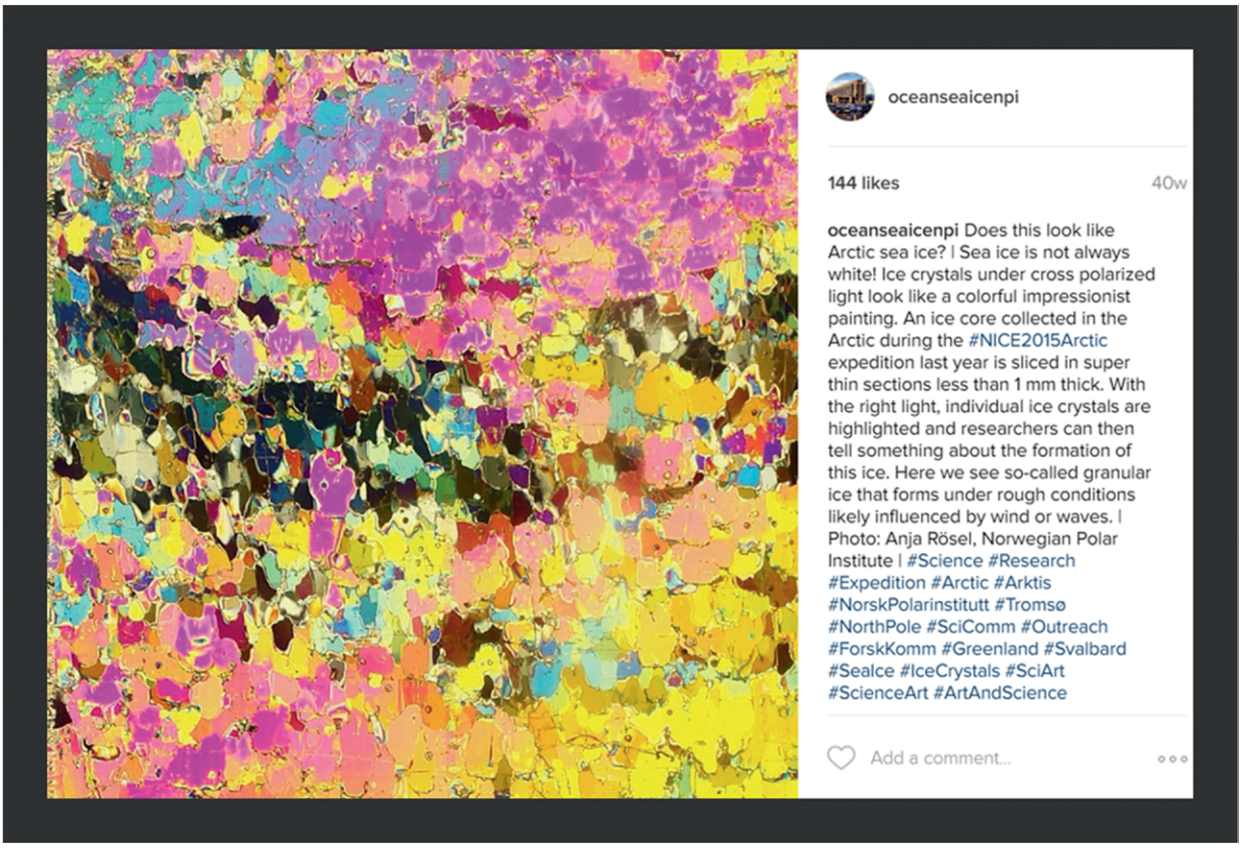

Fig. 6. Example of an @oceanseaicenpi post from 25 Jan 2016, showing a photo of a thin section of sea ice and explaining the concept in the accompanying text, as seen on Instagram.

- On Twitter, fresh information is key. With text limited to 280 characters, stick to key words and engage your public. This is a great platform to talk about meetings you are attending, post recent findings and publications, and share interesting science you come across. Tag relevant Twitter accounts and use relevant hashtags for best results.

Ways to maximize the effectiveness of your team. Teamwork is a key to success. For us, getting as many people within the group involved was important to share the workload and build a cohesive team. We recommend engaging early career researchers, as they likely know recent trends and have social media experience. Furthermore, different members of the group are complementary: some are good at sourcing great photos, some are good at writing stories, some are good at the technical side of social media, some are native English speakers able to check the grammar of posts, and others have good intuition about which posts will work and which will not. Combining experience and skills is key to making your science communication effort a success. In terms of sharing the responsibilities, it is important to find a routine that suits your team best. One can consider an option where several people are looking after each of the social media accounts and ask for specific contributions from other team members. Alternatively, one could devise a schedule so that each week a new person is responsible for preparing a post. Another practical tip is to consider purchasing a gadget (e.g., tablet) that stays "in house" and can be used as the main tool for making posts. Hence, the team does not depend on specific people being at work, ensuring the continuity of the posts. Each weekly post on Instagram, which is shared on Facebook and Twitter, involves the following steps with approximate time spent on each step: making a draft of the post (30–40 min), commenting from the team (3–4 persons, 5 min each, results in 15–20 min), posting on Instagram (15 min), reposting on Facebook (automatic), reposting on Twitter (5 min), and updating statistics (5 min). This gives an average of 1.5 h of total time spent by several team members to prepare for the weekly post that goes across three social media platforms. Additional posts on Twitter (e.g., publication highlights) could take up to an additional 0.5–1 h a week. The time the team members

spent on creating a post is considered to be active outreach work, which is covered by the individual projects of the scientists.

Keep track of your progress and optimize your activities. There are a number of tools that might help you to keep track of your performance and optimize your posts. Facebook and Twitter offer basic analytics tools free of charge, which are called "insights" and "analytics," respectively. Both provide metrics about the number of followers and page likes as a function of time, insights about the performance of individual posts, and key information about the geographic spread and age distribution of the audience. On Instagram, there is no built-in analytics by default; however, one can switch an Instagram account to a "business" mode, which will provide you with key information about age distribution and distribution of followers by location. Third-party services also exist to suit this purpose. We recommend researching the pros and cons of such services to understand which is best suited for your team before subscribing. One example of the benefit of having this information is that knowing about the geographic spread of your audience allows you to tailor the timing of posts to the most common time zone of your followers. Keep track of the engagement rate of your audiences for different posts: How often do they comment? How often do they retweet your posts? What time of the day do your audiences interact most? This information can be used to tailor posts accordingly and concentrate on engaging content.

We usually evaluate statistics on our social media accounts on a weekly basis, coincident with regular postings on Fridays. The total number of followers on Instagram and Twitter and the number of Facebook page likes are the key available metrics for us to evaluate the general performance of our accounts. Audience gains or losses provide indications about the increasing or decreasing interest of the public to our account. At the same time, the number of post likes on Instagram and Facebook and number of retweets on Twitter are used as key indicators of performance of individual posts.

Reach out and share your experience. High-quality posts are important to the success of your social media science communication effort. In addition, one way to gain new followers and to get more visibility for your initiative can include presentations at conferences and symposia. At most large conferences, there is an option to submit an extra educational or communications abstract. Over the past 2 years, we have presented the @oceanseaicenpi initiative a number of times (e.g., Meyer et al. 2016). Another way to build up your audience is to get in touch with other similar social media accounts and organize collaborative posts with mutual mentions of accounts in each other's posts. Based on our experience, such practices work well on Instagram.

Paid advertisements and promotions. Another way to gain followers is to use the various social media marketing tools that are offered directly by Facebook, Twitter, and Instagram. In addition, one can find a number of third-party services that can boost your audience. Below we describe our single experience with a paid promotion. During fall 2016, we conducted a case study with a Facebook page promotion. A budget of $60 (U.S. dollars) was allocated to run a campaign for two weeks between 18 October and 1 November 2016. A wide range of target audiences were selected using custom options. The choice of target countries was made in order to reach countries least represented among our followers.

During this period the number of page likes increased from 724 to 2,967, giving an average daily growth of ~160 likes (Fig. 2). The majority of likes came from young people: 56% from 13 to 17 years old, 38% from 18 to 24 years old, 5% from 25 to 44 years old, and 1% from 45 years old or more. The audience was composed of 12.9% women and 87.1% men across all age groups. Regionwise, the majority of page likes came from India (89.2%), followed by Brazil (5.4%) and Argentina (2.1%). Despite substantial audience growth, we did not notice any significant increase in attention (in terms of post likes, comments, and shares) to the content of the page, either during this period or after, with the majority of our new followers being inactive. In fact, adverse effects of the promotion were noted. Posts with higher engagement rates (based on a ratio of post likes to a total number of page followers) are prioritized in the Facebook news feed, triggering positive feedback for further visibility of the post. With a large number of newly gained "inactive" page followers, our posts have drawn less attention after the promotion campaign. We therefore recommend using the Facebook page promotion with caution.

Both Twitter and Instagram offer options for paid promotions and advertisements. We have not yet tried these. Best practices for advertising on Twitter and Instagram are described in various online articles, and we recommend doing some research before making the decision to do an advertisement campaign for your social media accounts.

CONCLUSIONS. The demand for better science communication by researchers is rising. We have described the emerging role of social media in communicating Earth sciences, which complements the traditional ways of reaching out to the public. While the most successful social media accounts in Earth sciences belong to large institutions and are managed by professional communicators, smaller research teams are an important and underrepresented niche in social media. Based on our 3-yr-long experience with the @oceanseaicenpi initiative, we demonstrate that it is possible for a small research group to conduct successful science communication on a regular basis using various social media platforms. With limited time and financial resources, the @oceanseaicenpi initiative has gained an audience of over 7,000 followers. To our knowledge, the @oceanseaicenpi Instagram account is the most successful in Earth sciences managed entirely by a research team. Inspired by our positive experience, glaciology and geology research groups at NPI have also started social media accounts to communicate their science. Such accounts managed by research teams are complementary to ones managed by professional communicators and should not replace them. By providing practical tips, we hope to inspire other research groups to develop effective science communication via social media. Building a direct bridge between the general public and scientific community not only engages the next generation into science, it also reduces the gap between what the scientific community knows and what the public believes. This, in turn, empowers the public and policymakers to make informed decisions and helps to shape a better future for our planet.

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